

FIG. 1

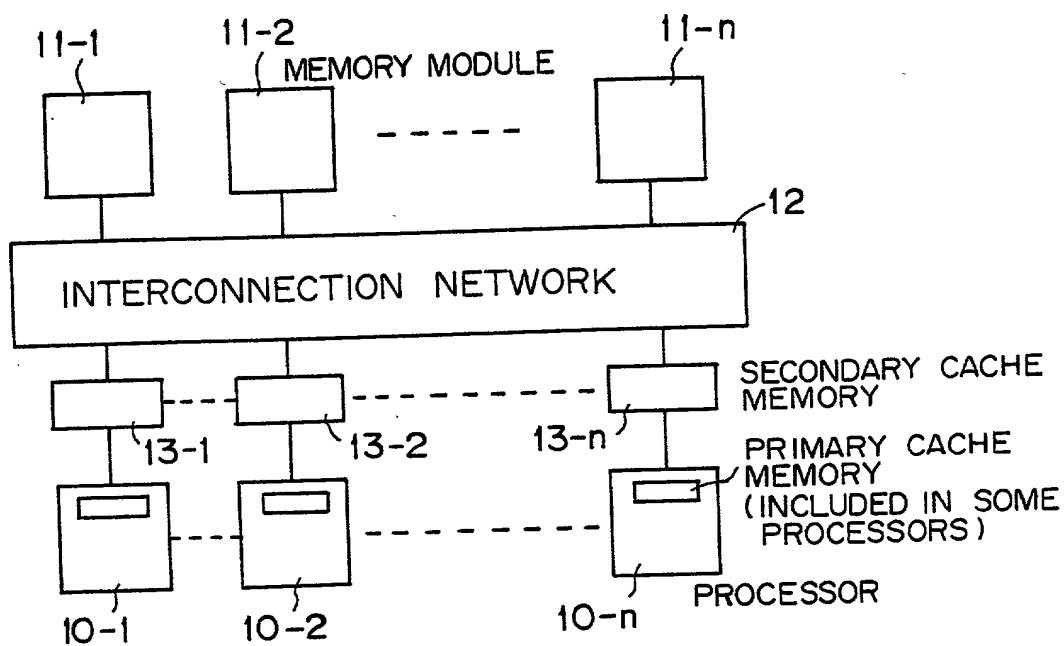


FIG. 1

	<div> <div> D UU </div> <div> LL </div> </div>	<div> U </div> <div> U1 </div>	<div> U </div> <div> U2 </div>	<div> U </div> <div> U3 </div>
	L1	C1		
	L2	C2		
	L3	C3		

FIG. 2

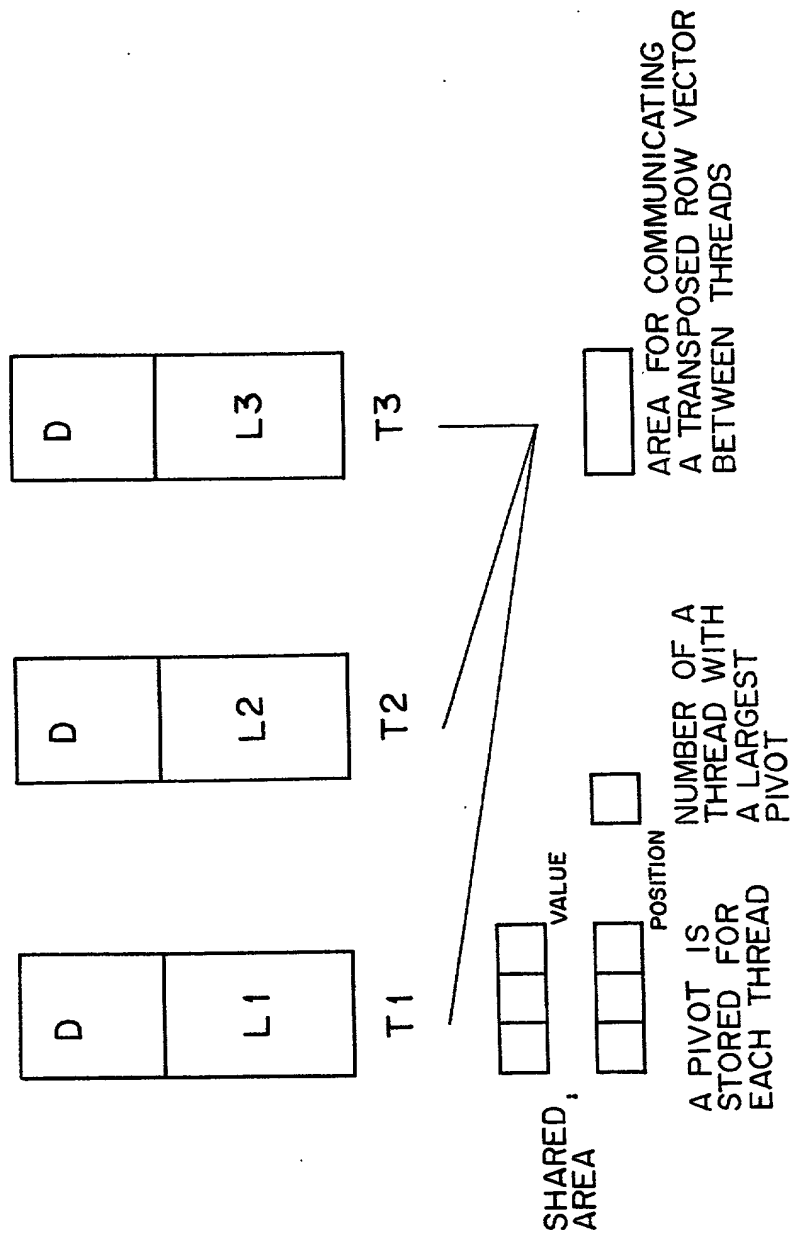


FIG. 3

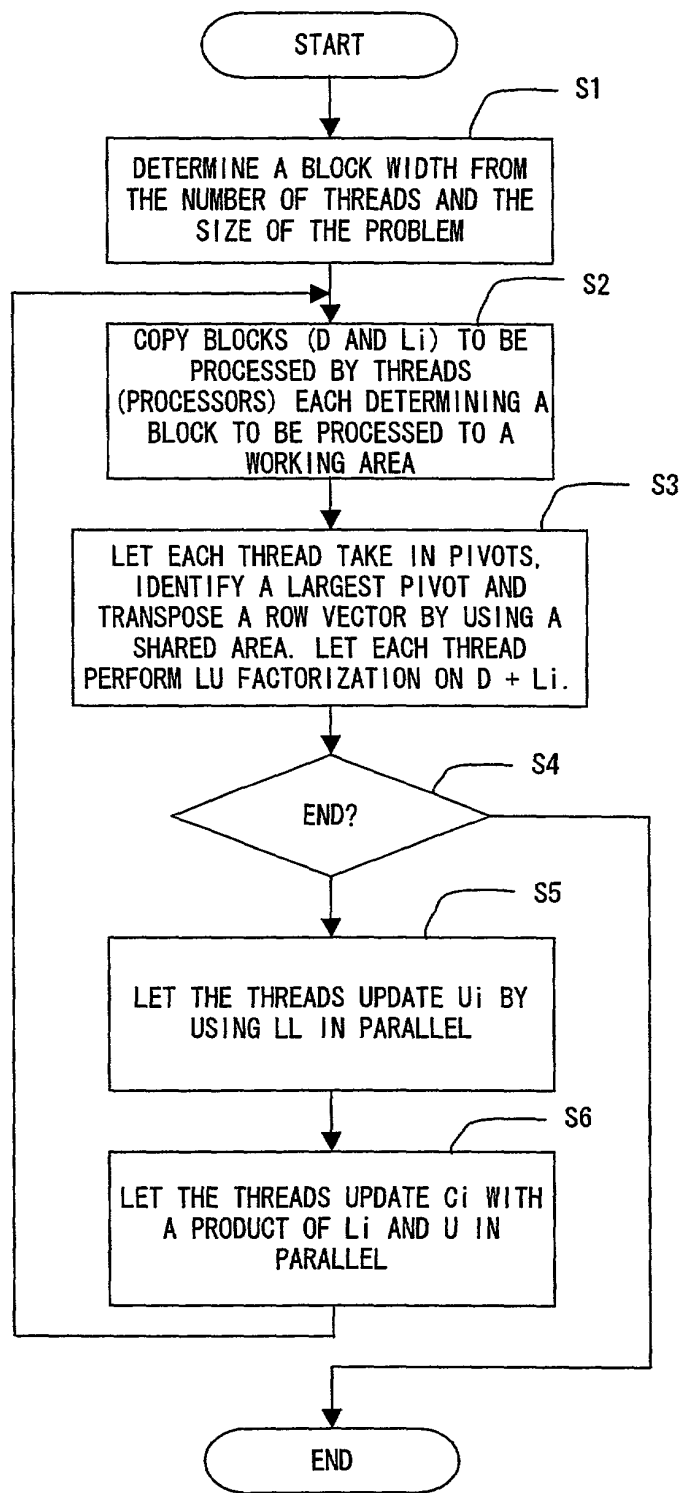


FIG. 4

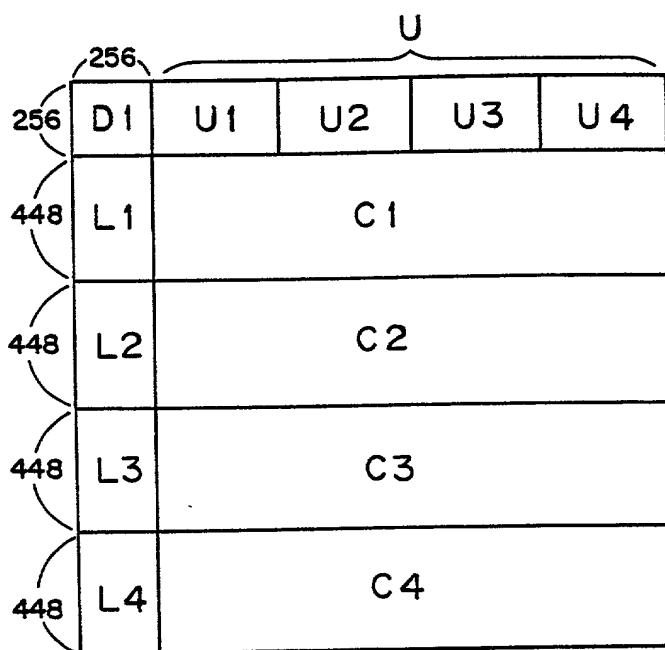


FIG. 5

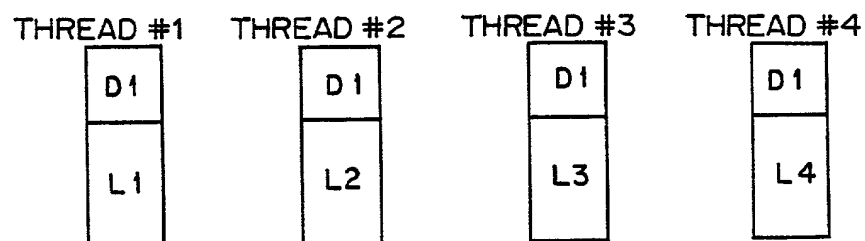
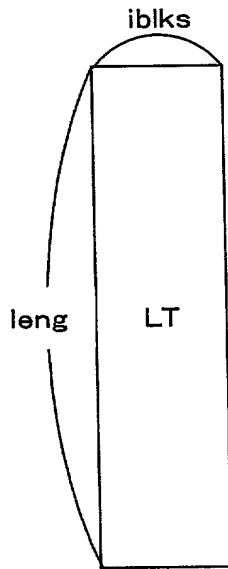


FIG. 6



```

DO i=1, iblks
  TMP=0.0 DO;jj=0
  DO j=i, leng
    IF(ABS LT(j, i)), GT , TMP)THEN
      TMP=ABS(LT(j, i))
      jj=j
    ENDIF
  ENDDO

```

(1)

```

IF(jj, GT, i) THEN
  DO k=1, iblks
    TMPX=LT(i, k)
    LT(i, k)=LT(jj, k)
    LT(jj, k)=TMPX
  ENDDO
END IF

```

(2)

```

DO k=i+1, iblks
  LT(i, k)=LT(i, k)/LT(i, i)
ENDDO

```

```

DO k=i+1, iblks
  DO l=i+1, leng
    LT(l, k)=LT(l, k)-LT(l, i) × LT(i, k)
  ENDDO
ENDDO

```

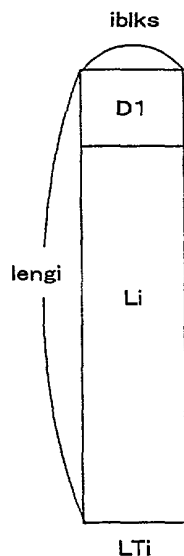
(3)

```

ENDDO

```

FIG. 7



```
DO i=1, iblks
  TMP=0,0 DO:jj=0
  DO j=1, lengi
    IF(ABS LTI(j, i)), GT , TMP)THEN
      TMP=ABS(LTI(j, i))
      jj=i
    ENDIF
  ENDDO
  pivot(#THREAD)=jj
  (#THREAD IS A THREAD NUMBER. IN THE
  CASE OF PARALLEL PROCESSING BY 4
  THREADS, #THREAD IS PRESCRIBED AS
  1,2,3 AND 4.)
```

(4)

(5)

BARRIER SYNCHRONIZATION

```
IF(#THREAD, EQ, 1)
  jx=0; GPIVOT=0
  DO ix=1, 4
    IF(pivot(ix), GT, jx. AND, PIVOT(ix). GT. iblks) GPIVOT=ix
    (THE NUMBER OF A THREAD HAVING A LARGEST NUMBER)
```

(6)

ENDDO

END IF

BARRIER SYNCHRONIZATION

```
IF(#THREAD, EQ, GPIVOT)THEN
```

```
  IF(jj, GT, i)THEN
```

```
    DO ix=1, iblks
```

```
      ROW(ix)=LTI(jj, ix)
```

ENDDO

END IF

BARRIER SYNCHRONIZATION

```
IF(GPIVOT, EQ, 0)THEN
```

```
  IF(jj, GT, i)THEN
```

```
    DO i=1, iblks,
```

```
      TMPW=LTI(i, ix)
```

```
      LTI(i, ix)=LTI(jj, ix)
```

```
      LTI(jj, ix)=TMPW
```

ENDDO

END IF

ELSE

```
  IF(#THREAD, EQ, GPIVOT)THEN
```

```
    DO ix=1, iblks
```

```
      LTI(jj, ix)=LTI(i, ix)
```

```
      LTI(i, ix)=ROW(ix)
```

ENDDO

ELSE

```
    DO ix=1, iblks
```

```
      LTI(i, ix)=ROW(ix)
```

ENDDO

ENDIF

SINCE TRASPOSITION HAS  
BEEN CARRIED OUT IN AN IP,  
THE THREADS EXECUTE THE  
PROCESSING IN PARALLEL

(7)

(8)

```
DO k=i+1, iblks,
```

```
  LTI(i, k)=LTI(i, k)/LT(i, i)
```

ENDDO

(9)

```
DO k=i+1, iblks
```

```
DO l=i+1, lengi
```

```
  LTI(l, k)=LTI(l, k)-LTI(l, i) × LTI(i, k)
```

ENDDO

ENDDO

(10)

ENDDO

FIG. 8



256	D 1	U 1	U 2	U 3	U 4
384	L 1	C 1			
384	L 2	C 2			
384	L 3	C 3			
384	L 4	C 4			

FIG. 9

subroutine LU(LTi, k, iblks, ist, nwid)  
 (WHERE LT<sub>i</sub> IS USED BY THREADS FOR STORING (D<sub>1</sub>+L<sub>i</sub>),  
 k IS THE SIZE OF THE FIRST ONE DIMENSION OF LT<sub>i</sub>,  
 iblks IS THE BLOCK WIDTH,  
 ist IS A POSITION TO START THE Lu FACTORIZATION AND  
 nwid IS THE WIDTH OF AN OBJECT SUBJECTED TO THE Lu FACTORIZATION)  
 IF(nwid, eq, 8), Then(A WIDTH OF 8 IS A MINIMUM).

LT<sub>i</sub>(ist:k, ist, ist+nwid-1) IS SUBJECTED TO THE LU FACTORIZATION IN  
 PARALLEL.

HERE, THE PARTS (4) TO (10) OF FIG.9 ARE EXECUTED.  
 IN THIS CASE, THE ROW-TRANSPOSING UNIT TRANSPOSES  
 LT<sub>i</sub>(i, 1, iblks) AT THE LENGTH iblk.

else

call LU(LTi, k, iblks, ist, nwid/2)  
 call TRS( )  
 UPDATE LT<sub>i</sub>(ist:ist+nwid/2-1, ist+nwid/2:ist+nwid). BY USING A  
 LOWER-TRIANGULAR MATRIX LL OF LT<sub>i</sub>(ist:ist+nwid/2-1, ist:ist+nwid/2  
 -1), UPDATE IT BY MULTIPLYING IT BY LL<sup>+</sup> FROM THE LEFT.

call MM( )  
 LT<sub>i</sub>(ist+nwid/2:k, ist+nwid/2:ist+nwid)  
 =LT<sub>i</sub>(ist+nwid/2:k, ist+nwid/2:ist+nwid)  
 -LT<sub>i</sub>(ist+nwid/2:k, ist:ist+nwid/2-1) x  
 LT<sub>i</sub>(ist:ist+nwid/2-1, ist+nwid/2:ist+nwid)

Barrier SYNCHRONIZATION

call LU(LTi, k, iblks, ist+nwid/2, nwid/2)  
 end if  
 return  
 end subroutine

FIG. 10

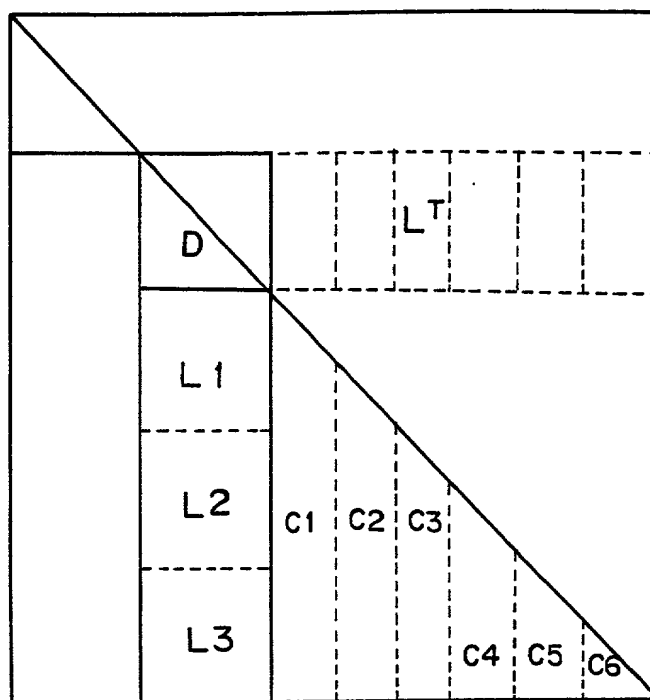


FIG. 11

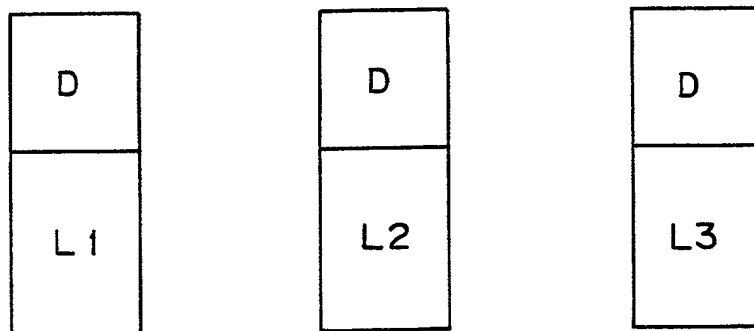


FIG. 12

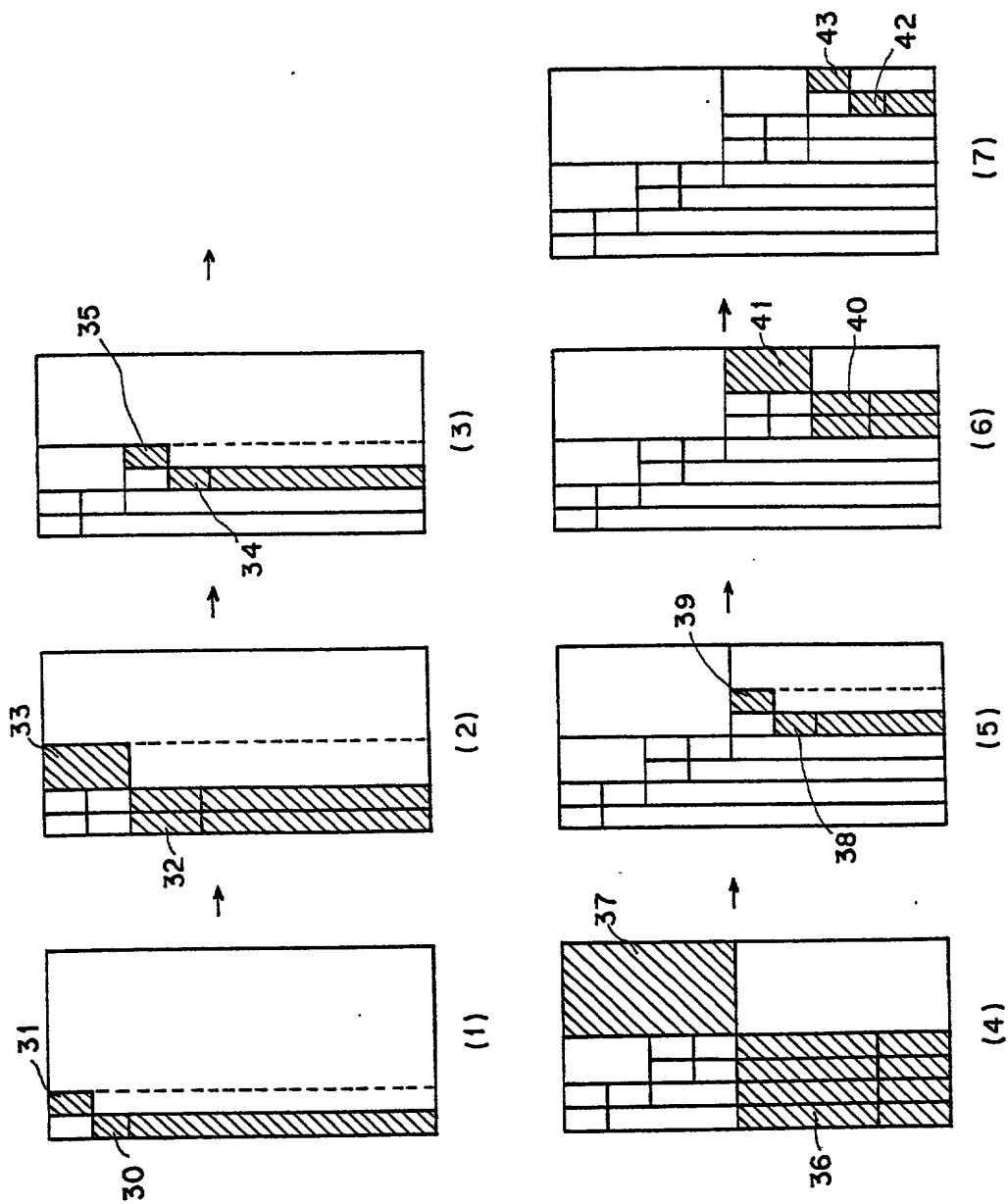


FIG. 13

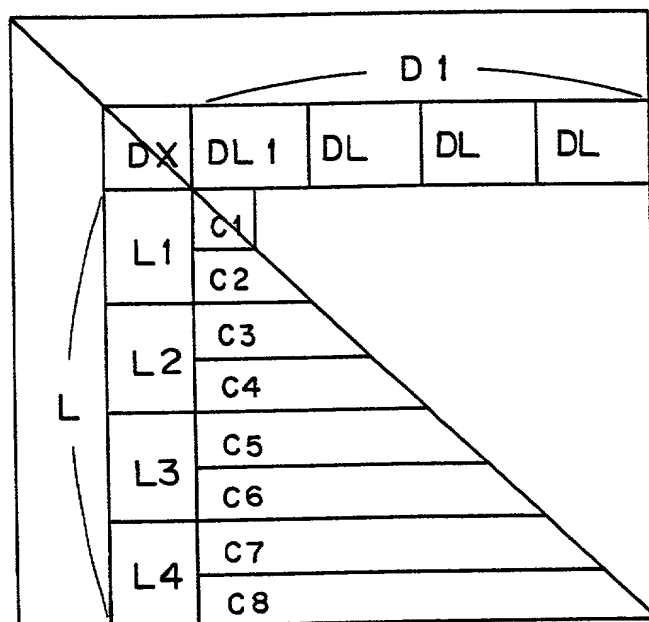


FIG. 14

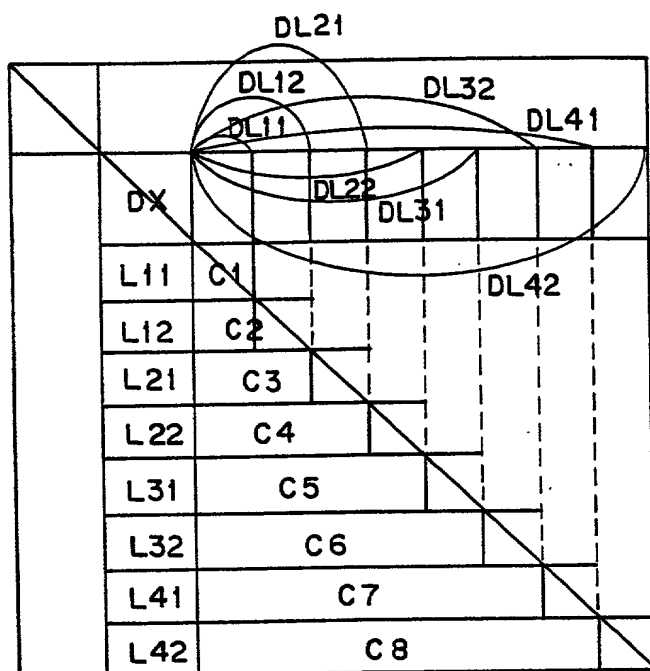


FIG. 15

subroutine LTD(LTi, k, iblks, ist, nwid)  
 IF(nwid, EQ, 8) THEN (THE WIDTH OF 8 IS THE MINIMUM)  
 DOi=ist, ist+7  
 DOj=i+1, ist+7  
 LTi(i, j)=LTi(j, i)  
 LTi(j, i)=LTi(j, i)/LTi(i, i)  
 ENDDO  
 DO jy=i+1, ist+7  
 DO jx=jx, ist+7  
 LTi(jx, jy)=LTi(jx, jy)-LTi(jx, i) × LTi(i, jy)  
 ENDDO  
 ENDDO  
 (20)  
 UPDATE LTi(LTi(ist+8:k, ist:ist+7).  
 SINCE  $DL^T$  IS INCLUDED IN THE UPPER TRIANGLE OF  
 LTi(LTi(ist:ist+7, ist:ist+7), UPDATE  $(PL^T)^{-1}$  FROM THE RIGHT.  
 ELSE  
 call LDL(LTi, k, iblks, ist, nwid/2)  
 COPY  $DL^T$  TO  
 $\cdot LTi(ist:ist+nwid/2-1, ist+nwid/2:ist+nwid-1)$ .  
 (D IS AN OBJECT ELEMENT OF LTi(ist:ist+nwid/2-1, ist:ist+nwid/2-1)  
 AND L IS  
 LTi(ist+nwid/2:ist+nwid-1, ist:ist+nwid/2-1),  
 TRANSPOSING THIS  $L^T$ .)  
 $\cdot$ UPDATE LTi(ist+nwid/2:k, ist+nwid/2:ist+nwid-1).  
 ( LTi(ist+nwid/2:k, ist+nwid/2:ist+nwid-1)  
 =LTi(ist:ist+nwid/2:k, ist+nwid/2:ist+nwid-1)-  
 LTi(ist+nwid/2:k, ist:ist+nwid-1) ×  
 LTi(ist:ist+nwid/2-1, ist+nwid/2:ist+nwid-1)  
 CALL LDL (LTi, k, iblks, ist+nwid/2, nwid/2)  
 ENDIF  
 RETURN  
 END

FIG. 16